DEPARTMENT SUMMARY

Systems Management is the largest academic department at the Naval Postgraduate School (NPS), with approximately 70 full-time faculty and 30 support staff. At any given time, there are over 400 students enrolled in one of Systems Management's graduate education programs. The department's mission is to "improve the managerial capabilities and leadership qualities of Naval and other officers, as well as government executives, through graduate education, research, and professional service"; further, Systems Management strives to "conduct a variety of research that supports military decision making, problem solving, and policy setting, improves administrative processes and organizational effectiveness, contributes knowledge to academic disciplines, and develops the quality of graduate education." Faculty research is an important component of System Management's mission, and it is integrated to the greatest possible extent with the educational process. Students are encouraged to participate in faculty projects, and faculty research results are typically incorporated in classroom instruction. The department's research efforts are augmented through its affiliation with the Institute for Defense Education and Analysis (IDEA) and by the participation of adjunct professors in many specialty areas.

Functional Areas

The Department of Systems Management has primary responsibility for four academic programs. The largest program is a group of curricula in Systems Management. These curricula include Acquisition and Contract Management, Systems Acquisition Management, Financial Management, Manpower Systems Analysis, Material Logistics Support, Systems Inventory Management, Transportation Logistics Management, and Transportation Management. Graduates of curricula in the Systems Management Program receive the degree of Master of Science in Management, which is accredited by the National Association of Schools of Public Affairs and Administration. The other three programs for which the department is responsible are the Information Technology Management Curriculum, whose graduates receive the degree of Master of Science in Information Technology Management; the Resource Planning and Management for International Defense Curriculum, which awards the degree of Master of Science in International Resource Planning and Management; and a graduate program in Leadership Education and Development (for Company Commanders at the U.S. Naval Academy), which awards a Master of Science in Leadership and Human Resources Management. In 1998, academic divisions were reorganized and the Information Systems curriculum was transferred to the Division of Computer and Information Sciences and Operations. This discussion provides an overview of research in the Department of Systems Management during 1997.

In addition to resident graduate education programs, the Department of Systems Management also offers off-site educational programs through teleconferencing and on-site instruction. In 1997, course offerings via distance leaning included programs in Acquisition Management, Information Technology Management, and Fundamental Management. Additionally, course modules were delivered as part of the department's BuMed Executive Management Education Program and the TRICARE Financial Management Executive Education Program.

Systems Management faculty are drawn from a wide variety of academic disciplines—including management, business and public administration, political science, economics, education, accounting, law, information systems, psychology, operations research, and other fields—to meet the demands of the department's diverse curricula. In addition, faculty represent a number of sub-disciplines within academic areas. For example, in 1997, faculty with doctorates in economics specialized in labor economics, econometrics, microeconomics, political economy, and public finance; faculty with graduate degrees in psychology included those with specialization in psychometrics, industrial/organizational psychology, clinical psychology, experimental psychology, social psychology, and military psychology. In total, there are over 100 academic sub-disciplines represented within the Department of Systems Management.

The department's diverse, multidisciplinary character is similarly reflected in the breadth and depth of issues addressed by faculty research, which has historically been concentrated in applied areas of interest to the Departments of Defense and Navy. The department's research program may touch upon 50 or more distinct topics within the course of a year. These topics and issues can be grouped into six functional areas, based on the department's curricula. In 1997, the department's six functional areas included the following:

Acquisition and Contracting
Logistics and Transportation
Information Technology Management
Financial Management
Manpower Systems Analysis
Organization, Management, and Policy Analysis.

Planning For the Future: General Guiding Principles

As noted, research in the Department of Systems Management is multidisciplinary and often widely diverse; but, all research is directed toward a common set of goals. As stated in the department's mission statement, the department conducts a variety of research to:

- ∗support military decision-making, problem-solving, and policy-setting;
- ∗improve administrative processes and organizational effectiveness;
- ∗contribute knowledge to academic disciplines; and
- ∗develop the mission of graduate education.

The primary goal of the department's research program is to provide the Navy and DoD with the capability of managing defense systems efficiently and effectively. This includes the efficient and effective utilization of resources, which derive from an existing base of knowledge or may require the development of new concepts and theory. Thus, the department recognizes the importance to the Navy and DoD of both basic and applied research; and it seeks to create a balance of both types of research in its research program.

The department's research program goals are further specified as follows on the Systems Management "web" page (http ://web.nps.navy.mil_sm/research.html):

- ∗to apply the foundations of existing knowledge in support of resource utilization decisions;
- ∗to develop new concepts or theory where no foundation of knowledge exists to support the policy decision-making process;
- ∗to enhance the relevance of the department's instructional programs; and
- ∗to involve the students in research, through their thesis work or class projects, in a manner that will enhance their decision-making capability.

Concepts, theory, and existing knowledge can generally be identified with a particular functional area or discipline. Actual resource utilization decisions or policies often require information or perspectives drawn from a variety of functional areas. Consequently, in addition to pursuing functional area research with a critical mass of faculty, the department actively seeks to engage in cooperative, interdisciplinary research. Such research places the department in a strong position to assist defense policy makers, since it allows for a coordinated, broad-based program under "one roof"—where researchers from diverse fields can share information and findings in a unified and truly systematic fashion.

Planning for the Future: Research Opportunities by Functional Area

As the department prepares for the challenges of the future, it is appropriate to consider research fields that would help Systems Management achieve its program goals and simultaneously assist defense decision-makers. Potential fields of inquiry, or research opportunities for the future, are discussed below by each of the department's six functional areas.

Acquisition and Contract Management. Defense acquisition represents a process of critical importance to the military, not only to reduce taxpayer costs, but to ensure the quality and performance of today's increasingly sophisticated weapon systems. Nevertheless, negligible academic research has been applied to systematically investigate, understand, and model the acquisition process; and current innovations in this domain—such as process reengineering and acquisition reform—are uncoordinated, ad-hoc, and performed largely on a trial-and-error basis. This is the case because many acquisition policy makers and executives have little or no benefit of theory for practice.

The acquisition group's primary objective is outlined as a five-year program of multidisciplinary research, designed to address this dearth of acquisition theory. Generally, research objectives are directed at the following:

- ∗basic theory-building research into critical questions;
- *fundamental dimensionality and key attributes associated with defense acquisition; and
- *exploring the integrated reengineering and reform of acquisition processes through the development of empirical models, prototyping of advanced technologies, and rigorous analysis of process innovations and regulatory reform.

This research represents seminal scholarly work in the area of defense acquisition and draws from expertise in accounting, contracting, economics, information systems, law, organizational design, public policy, and other academic are disciplines. The research program also plans for contributions not only from the NPS faculty, but through collaborative research with other top-ranked universities outside DoD. This initial work can also help to establish both a precedent and the stan-

dard for other research institutions to follow in terms of acquisition research; and it complements similar efforts by the department and NPS to reach beyond the customary, defense-oriented pool of researchers.

Logistics and Transportation. The primary mission of the Logistics and Transportation group is to educate military officers and DoD civilians in state-of-the-art concepts of logistics and transportation management. Emphasis is placed on understanding both military and non-military applications, so that students will be prepared to perform effectively in a military environment and interact efficiently with civilian contractors and suppliers. The general research perspective of the group is focused on improving DoD logistics and transportation performance as well as management effectiveness. Major research areas for the future include:

*DoD inventory policy;
*inventory and cycle time reduction;
*defense transportation and distribution systems;
*Total Asset Visibility (TAV) and real-time logistics/Transportation control;
*modeling and simulation for logistics decision support;
*reduction of manpower in aircraft and ship maintenance;
*aircraft Component Improvement Program (CIP); and
*sea-based logistics for the Navy and the Marine Corps.

Information Technology Management. The importance of information technology is widely recognized in DoD and the Navy. For many technical, economic, demographic, and political reasons, the U.S. must emphasize improved quality rather than quantity in its military force structure. Applications of computer technology offer one of the most important avenues for achieving such quality. This is manifested in the growing proliferation and power of "smart" weapons; and in increased reliance on command and control systems. Further, any fundamental improvements in the efficiency and effectiveness of managing the military services—for example, in logistics, human resource management, and financial control—will almost certainly require the use of computer-based systems. The most recent Defense Critical Technologies Plan selects 20 areas of technology that are regarded as the most critical in supporting the military needs of the U.S. Information technology is a direct or indirect ingredient in practically all of these critical areas.

The unique character and scale of DoD makes it especially difficult to implement successful information systems. There is yet a great deal to be learned about how systems can be improved, about how to develop them more rapidly and economically, and about how to cope with required organizational changes. Potential areas for future research by the information technology management group are aimed at resolving such issues. Specifically, three major research areas are targeted for the future:

*applied research in software engineering;
*decision support systems; and
*economics and management of information.

Applied research in software engineering continues to be an important field of study and particular strength of the Information Technology Management (ITM) group. The group's area of expertise comprises the following: project management, risk management, traceability, and the human and economic aspects related to software engineering. In the field of decision support systems (or DSS), the group has recently migrated its well-established expertise to developing multimedia, internet-deployable DSS components to support geographically-distributed organizations. The major research focus of the faculty in DSS centers on modeling and simulation, group decision and negotiation, and expert systems development. DSS technology is also being used to develop intelligent, computer-based education and training systems. Several of the ITM faculty are engaged in research relating to the economics and management of information. A number of quantitative and qualitative methods are used based on microeconomics, statistics, and social science to perform economic evaluation of information systems, ranging from cost-benefit analysis to reengineering of information technology.

Financial Management. Research in the area of financial management has become increasingly important since the end of the Cold War, as defense organizations "downsize" and policy makers exercise renewed efforts to gain maximum utility of

shrinking resources at minimum cost. The Financial Management (FM) group has identified three major functional areas as targets of opportunity for future research. These are:

*financial resource policy formulation, analysis and management;
*financial management and budgeting; and
*cost analysis.

The first of these functional areas—financial resource policy formulation, analysis, and management—covers a range of sub-areas: national defense and national security resource policy and management; resource planning, programming, budgeting, and policy under the Planning, Programming, Budgeting System; and relationships between financial management, contracting, acquisition, and other policy fields. Financial management and budgeting includes the following: federal, DoD, and Navy budget formulation and execution; impacts of budget allocation, reallocation, and reduction; implementation of Defense Resource Management Systems; and the Chief Financial Officer Act and federal financial management reforms. The research area of cost analysis, in turn, covers the following: weapon systems and software cost estimation; resource requirement analysis; the cost of new technologies; and cost analysis of major system modifications.

Manpower Systems Analysis. As noted above, the primary goal of the department's research programs is to provide defense policy makers with the capability of utilizing resources with maximum efficiency and effectiveness. This includes *human* resources, the focus of research in the Manpower Systems Analysis (MSA) group. Defense manpower policy makers have been faced with many challenges since the end of the Cold War. Key among these challenges were a reduction of the active-duty force by over 30 percent, budget reductions in recruiting and advertising, a steady operational tempo and deployment schedule with fewer people, new missions, declining levels of public and congressional support for the military, increasing pressure to change the culture" of military service, renewed efforts toward population representation of women and racial/ethnic minorities throughout the force, a seemingly immovable, high rate of first-term attrition among new recruits, declining levels of personnel retention in certain critical areas, a number of high-profile "scandals," and others. As the active-duty force was reduced and missions changed, it soon became clear that a smaller military had to be even more skilled and adaptable than the one that witnessed the end of compulsory service and performed so successfully throughout the early 1980s and early 1990s. These challenges confronting defense manpower policy makers are recognized by the MSA group as opportunities for research that will have a lasting impact on the future of the force. MSA research areas for the future can be summarized as follows:

∗manpower supply and force requirements;
∗improvements in selection and classification of enlisted personnel;
∗improvements in selection of officers and pre-commissioning programs;
∗effectiveness of equal opportunity and diversity management programs;
∗training effectiveness and efficiency;
∗innovations in instructional technologies;
∗personnel retention in critical fields;
∗reduction of first-term attrition rates among enlisted personnel;
∗force management programs and planning;
∗force structure and cost analysis;
∗career-force modeling;
∗officer promotion and performance;
∗civil-military relations and the All-Volunteer Force; and
∗manpower management in Reserve components.

The MSA group also expects to continue looking at the future manpower needs of the military, similar to its previous research for the Army, the Office of the Secretary of Defense, and the Navy.

Organization, Management, and Policy Analysis. Faculty in this functional area pursue basic and applied research on key management issues at a variety of organizational levels. Faculty bring a strategic perspective to this work, seeking to identify courses of action that will best achieve organizational goals in a given setting. Individual faculty are acknowledged experts who publish leading-edge research on a variety of issues. Top management issues include strategic planning, stakeholder analysis, organizational design (including the use of self-managing groups), downsizing, and the development of culture. Human resource management issues include the design of strategic reward systems, managing gender and diversity issues, managing stress, forming career identities, and alternative strategies to training and education (including

distance learning). There is a strong expertise in leadership at all organizational levels. Leadership issues studied by faculty include leadership development, the identification of key leadership skills, innovation and change, motivational strategies, empowerment, coaching, communications strategies, conflict management, entrepreneurship, and constructive uses of power. Faculty are also experts in a variety of research methodologies from highly sophisticated quantitative to in-depth qualitative analyses.

In addition to their subject area and methodological expertise, faculty have developed considerable knowledge of current military organizations through their research. Most of this work has been with Navy organizations, such as the Military Sealift Command, NAVAIR, CNET, Bureau of Medicine, and CINCLANTFLEET. However, faculty have also worked with organizations in other service branches, including extensive work with the U.S. Army Reserve Command and Coast Guard Headquarters. Recent DoD-wide research includes work for the 8th Quadrennial Review of Military Compensation. (Individual faculty have also consulted with state government agencies, the United Nations, and private-sector organizations.) Supervising student theses has broadened this knowledge even more. This organizational expertise increases the value of faculty as applied researchers for DoN and DoD organizations.

Generally, several research areas will be pursued in the future. These include:

- ∗management of change in complex organizations;
- ∗management of base closures and downsizing;
- ∗diversity management;
- ∗assessment of core values in a changing environment;
- ∗organizational issues related to involvement in nontraditional missions or operations other than war;
- ∗mplementing Total Quality in DoD and the Navy;
- ∗issues relating to managerial communication;
- ∗leadership;
- ∗intrinsic motivation (work-derived rewards);
- ∗managing stress and emotion in organizations;
- ∗strategic planning and management; and
- ∗issues related to “reinventing” government**.**

Research Labs and Centers

In 1997, the Department of Systems Management operated seven research labs: the Software Metrics Lab, the DecisionNet Lab, the Interoperability and Integration Lab, the Center for Organizational Computing, the Hands-On Networking Lab, the Database and Expert Systems Application Lab, and the Internet-to-the-Sea Lab. It is anticipated that these laboratories will be maintained.

In addition, during 1997, the Department of Systems Management was the “home” of five research centers: the Center for Information & Policy Analysis, the Software Metrics Center, the Center for Diversity Analysis, the Decision and Information Systems Center, and the Military Economic Strategy Center for Asia. The department expects to maintain these research centers over the near term; and it is likely that new centers will be established as the department’s research program continues to develop.